SCHEME OF MCA COURSE

MCA FIRST SEMESTER:

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Name</th>
<th>C/E/S</th>
<th>L</th>
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<tbody>
<tr>
<td>101MCA</td>
<td>Introduction to Information Technology</td>
<td>Core</td>
<td>4</td>
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<tr>
<td>102MCA</td>
<td>Mathematical Foundations of Computer Science</td>
<td>Core</td>
<td>4</td>
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<tr>
<td>103MCA</td>
<td>Programming and Problem Solving in 'C'</td>
<td>Core</td>
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<tr>
<td>104MCA</td>
<td>Computer Organization and Assembly Language</td>
<td>Core</td>
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<tr>
<td>105MCA</td>
<td>Oral and Written Communication</td>
<td>Skill</td>
<td>4</td>
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<tr>
<td>106MCA</td>
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<tr>
<td>107MCA</td>
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<td>108MCA</td>
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<tr>
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Total Credit: 

MCA SECOND SEMESTER:

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<tr>
<td>201MCA</td>
<td>Operating Systems</td>
<td>Core</td>
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<tr>
<td>202MCA</td>
<td>Database Management Systems</td>
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<tr>
<td>203MCA</td>
<td>Data Structures Using 'C' language</td>
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<td>204MCA</td>
<td>Probability and Combinatorics</td>
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<tr>
<td>205MCA</td>
<td>Software Engineering</td>
<td>Core</td>
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<tr>
<td>206MCA</td>
<td>Programming Laboratory in RDBMS (SQL &amp; PL/SQL)</td>
<td>Core</td>
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<td>207MCA</td>
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Total Credit: 

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### MCA THIRD SEMESTER:

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<td>302MCA</td>
<td>Object Oriented Programming using C++</td>
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<td>305MCA</td>
<td>Organisational Behaviour</td>
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<td>Project in C++</td>
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**Total Credit : 26+4 (Virtual Credit)**

### MCA FOURTH SEMESTER:

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<td>Analysis and Design of Algorithms</td>
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<td>403MCA</td>
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<td>Optimization Techniques</td>
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<td>405MCA</td>
<td>Accounting &amp; Management Control</td>
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<td>Project in Java</td>
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**Total Credit : 26+4 (Virtual Credit)**
MCA FIFTH SEMESTER:

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<tr>
<td>501MCA</td>
<td>Artificial Intelligence and Expert Systems</td>
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<td>502MCA</td>
<td>Computer Graphics and Multimedia</td>
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<td>Simulation and Modeling</td>
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<td>Dataware housing and data mining</td>
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<td>505MCA</td>
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<td>506MCA</td>
<td>Project in .Net Technology</td>
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Total Credit: #26+4 (Virtual Crédit)

MCA SIXTH SEMESTER:

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<tbody>
<tr>
<td>601MCA</td>
<td>System Development Project (Here student is required to undertake six months system development project in the Industry or in a Computer Organization and submit a detailed project report)</td>
<td>skill</td>
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Total Credit: #12+4 (Virtual Crédit)

Elective course List

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<th>Elective</th>
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<tr>
<td>E1</td>
<td>Unix &amp; shell scripting</td>
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<tr>
<td>E2</td>
<td>ERP &amp; RPR Allied Concepts</td>
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<tr>
<td>E3</td>
<td>Theory of computation</td>
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<tr>
<td>E4</td>
<td>Distributed System</td>
</tr>
<tr>
<td>E5</td>
<td>Cloud Computing</td>
</tr>
<tr>
<td>E6</td>
<td>Net Technology</td>
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</tbody>
</table>
UNIT 1- Basic concepts of IT, concepts of Data & Info, data processing, history of computers (generation, type of languages), organization of computers, I/O devices, storage devices, system software, application software, utility packages, numerical based on storage devices. Concept of communication and network technology. Applications of IT.

UNIT 2- Assembler: Elements of assembly language programming, a simple assembly scheme, pass structure of assembler, design of two pass assemblers, a single pass assemblers. Macros & Macro Processors: Macro definition & Call, Macro expansion Nested macro calls, advanced macro facilities, design of macro processors

UNIT 3- Compilers & Interpreters: aspects of compilation, memory allocation, compilation of expression compilation of control structures, code optimization, interpreters. Software Tools: Software tools for program development, editors, debug monitors, programming environment, user interfaces.

UNIT 4- Linker & Loaders: Relocation & linking concepts, design of linkers, self relocating programs, a linker for MS DOS, linking for overlays, loaders: A two pass loader scheme, Relocating loaders, subroutine linkage, Direct linkage loader, Binders overlays.

UNIT 5- Sequential file organisation, random file organisation, index structure, indexed file organisation, alternate key indexed sequential files, multi key organisation, multi key access, multi list file organisation, inverted files & their definition, insertion, deletion, operations with optimum utilization of memory, comparison of various type of file organization.

References:

2. J.Donovan"System Programming"THM.
5. S.Jaiswal; "FundamentalofComputer&IT", WileydreamtechIndia.
102 MCA: MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

UNIT 1: Sets Relations and Functions: Sets, Subsets, Power-Sets, Complement, Union and intersection. Demorgan’s law, Cardinality, relations: Cartesian Products, relations relational Matrices, properties of relations, equivalence relation Functions: Injection, Surjection, Bijection Composition of Functions, Permutations. Cardinality, the characteristic functions Recursive definitions, finite induction. Lattices & Boolean Algebra:

UNIT 2: Axiomatic definition of Boolean algebra as algebraic structures with two operations. Proposition & Prepositional functions, Logical connections Truth values and Truth Table the algebra of prepositional functions-the algebra of truth values-Applications (switching circuits, Basic Computer Components).

Groups and Fields:

UNIT 3: Groups: Group axioms-permutation groups; Subgroups, Co-sets, Normal Subgroups, Free semi groups; Modular arithmetic grammars, language.

UNIT 4: Fields: Definition; structure; minimal polynomials; irreducible polynomials; primitive Elements, polynomial roots; Applications (Error Correcting Codes Sequence generation).

UNIT 5: Graphs: Finite graphs; incidence and degree, isomorphism, sub graphs and union of graphs; Connectedness; walks paths and circuits Eulerian graphs. Trees properties of trees, pendant vertices in a tree, Center of tree Spanning trees and Cut vertices; Binary tree Matrix representation of a graph, Incidence, Adjacency matrices and their properties. Applications of graphs in Computer Science.

REFERENCES:

3. "Discrete Mathematical Structures for Computer Science" by Bernard Kolman & Robert C. Busby
103MCA : PROGRAMMING AND PROBLEM SOLVING IN 'C'

UNIT 1-An Overview : Problem identification, analysis, design, coding, testing & debugging, implementation, modification & maintenance; algorithm & flowcharts; Characteristics of a good program - accuracy, simplicity, robustness, portability, minimum resource & time requirement, modularization; Rules/conventions of coding, documentation, naming variables; Top down design; Bottom up design.

UNIT 2-Fundamentals of C Programming : History of C; structure of a C program, Data types, Constants & Variables; Operators & expressions; Control Constructs - if-else, for, while, do-while; Case statement; Arrays; Formatted and unformatted I/O; Type modifiers & storage classes; Ternary operator; Type conversion & type casting; Priority & associativity of operators.

UNIT 3-Modular Programming: functions; Arguments; Return value; Parameter passing -call by value, call by reference; Return statement; Scope visibility and life-time rules for various types of variable, static variable; Calling a function; Recursion - basics, comparison with iteration, tail recursion, when to avoid recursion examples.

UNIT 4-Advanced Programming techniques: Special constructs- break, continue, exit, goto & level; pointers- & and * operator, pointer expression, pointer arithmetic, dynamic memory management functions like malloc(), calloc(), free(); string(); pointer v/s array; pointer to pointer, array of pointer and its limitations; function returning pointer, pointer to function, function as parameter; structure-basic, declaration, membership operator, pointer to structure, referential operator, self referential structure, structure within structure, array in structure, array of structure; Union -basic, declaration, enumerated data type; Typedef; command line arguments.

UNIT 5-Miscellaneous Features: File handling and related functions, printf and scanf family C preprocessor- basics, #include, #define, #undef. Conditional compilation directive like #if, #else, #elif, #endif, #ifdef and #ifndef, variable argument list functions.

References:
1. The C Programming Language - B.W. Kernighan & D.M. Ritchie
2. The Spirit of C - Cooper, Mullah
3. Kanetkar Y.: Let us C
4. Kanetkar Y.: Pointers in C
5. An Introduction to C programming – Amit Saxena, Anamaya Publishers, New Delhi
104 MCA: COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE PROGRAMMING

UNIT 1 - Representation of Information: number system, integer and floating point representation, character codes (ASCII, EBCDIC), error detection and correction codes.

UNIT 2 - Basic Building Blocks: Boolean algebra, combinational blocks: gates, multiplexers, decoders etc. Sequential building blocks: flip-flops, registers, counters, ALU, Random Access Memory etc.

UNIT 3 - Register Transfer Language and micro operations: concept of bus, data movement among registers, a language to represent conditional data transfer, data movement from/to memory, arithmetic and logical operations along with register transfer, timing in register transfer.

UNIT 4 - Architecture of a simple processor: A simple computer organization and instruction set, instruction format, addressing modes, instruction execution, in terms of micro instructions, concept of interrupt and simple I/O organization, implementation of processor using the building blocks.

UNIT 5 - Assembly Language Programming: detailed study of 8086/8088 assembly language instruction set, loops and comparisons, condition and procedure, arithmetic operator assembly language, illustrations using typical programs like: table search, subroutines, symbolic and numerical manipulations and I/O.
Memory Organization: basic cell of static and dynamic RAM, building large memories using chips, associative memory, cache memory organizations, virtual memory organization.

References:

2. Liu and Gibbon, "8086/8088 Microprocessor Assembly Language.
3. Bartee, "Digital computer Fundamentals".
4. Malvino, "Digital computer Electronics".

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105MCA : ORAL AND WRITTEN COMMUNICATION

UNIT 1-Meaning and process of communication, importance of effective communication, Communications situation and communication skills, barriers to communications.

UNIT 2-Objectives of communication, types of communication, principal of communication, essential of effective communication.

UNIT 3-Media of communication: written, oral, face to face, visual, audio visual, merits and demerits of written and oral communication, preparing for oral presentation, conducting presentations.

UNIT 4-Developing communication skills, interview how to face and how to conduct. Preparing of bio-data, seminar, paper, bibliography, group discussion, official correspondence.

UNIT 5-Mechanics of writing paragraphing, precise, report writing, technical reports, length of written reports, organizing reports, writing technical reports.

References:

4. Business Communication: Strategy and Skill

Note: Rehearsal / Practice: Group Discussions, Interview, seminars will be arranged.
201MCA : OPERATING SYSTEMS

UNIT 1: Introduction: Evolution of operating systems, Types of operating systems, Different views of the operating system, operating system Concepts and structure.
Processes: The Process concept, systems programmer’s view of processes, operating system services for process management. Scheduling algorithms. Performance evaluation.
UNIT 2: Memory Management: Memory management without swapping or paging, swapping, virtual memory, page replacement algorithms, modeling paging algorithms, design issues for paging systems, segmentation.
Inter-process Communication and Synchronization: The need for inter-process synchronization, mutual exclusion, semaphores, hardware support for mutual exclusion, queuing implementation of semaphores, classical problems, in concurrent programming, critical region and conditional critical region, monitors, messages.
Deadlocks: Deadlock Prevention, deadlock avoidance.
Input/output: Principles of I/O Hardware: I/O devices, device controllers, direct memory access.
Principles of I/O Software: Goals, interrupt handlers, device drivers, device independent I/O software.
User space I/O Software.
UNIT 4: Disks: Disk hardware, scheduling algorithms, Error handling, track-at-a-time caching, RAM Disks.
Clocks: Clock hardware, memory mapped terminals, I/O software.
Processes and Processors in Distributed Systems:
Threads, System models, processor allocation, scheduling.
UNIT 5: Performance Measurement, monitoring and evaluation: Introduction, important trends affecting performance issues, why performance monitoring and evaluation are needed, performance measures, evaluation techniques, bottlenecks and saturation, feedback loops.
Case Studies: MS-DOS, MS WINDOWS, LINUX (UNIX) Operating System.

References:
**202MCA : DATA BASE MANAGEMENT SYSTEMS**

**UNIT 1 - Introduction**: advantages of DBMS approach; various views of data, data independence, schema & sub-schema; primary concept of data models; database Languages; transaction management; database administrator & user; data dictionary; overall system architecture. ER model: basic concepts; design issues; mapping constraints; keys; ER diagram; weak & strong entity-set; specialization & generalization; aggregation, inheritance; design of ER schema; reduction of ER schema to tables. Domains, relation & keys: domains; relations; kind of relations; relational databases; various types of keys: candidate, primary, alternate & foreign keys.

**UNIT 2 - Relation algebra & SQL**: The structure; relational algebra with extended operation; modification of database; idea of relational calculus; basic structure of SQL; set operations; aggregate functions; null values; nested sub queries; derived relations; views; modification of database; join relations; DDL in SQL. Database Integrity: General idea; Integrity rules; domain rules; Attribute rules; Relation rules; Database rules; assertions; triggers; integrity & SQL.

**UNIT 3 - Functional dependencies & normalization**: Basic definitions; Trivial & non-trivial dependencies; closure set of dependencies & attributes; Irreducible set of dependencies; Introductions to normalization; Nonloss decomposition; FD diagram; First, Second and Third normal forms; Dependency preservation; BCNF; multivalued dependencies and fourth normal form; Join dependencies and fifth normal form.

Transaction, concurrency a Recovery: Basic Concept; ACID Properties; Transaction State; Implementation of Atomicity and Durability; Concurrent executions; Basic Idea of Serializability; Basic Idea of Concurrency Control; Basic Idea of Deadlock; Failure Classification; Storage Structure - types, Stable storage Implementation, Data Access, Recovery & Atomicity - Log Based Recovery, Deferred Database Modification, Immediate Database Modification, Checkpoints.

**UNIT 4 - Distributed Databases**: Basic idea; distributed Data Storage; Data Replication; Data Fragmentation - Horizontal, Vertical & Mixed Fragmentation.

Emerging Fields in DBMS: Object Oriented Databases - Basic Idea & the Model, Object Structure, Object Class, Inheritance, Multiple Inheritance, Object Identity, Data Warehouse - Terminology, Definitions, Characteristics, Data Mining & its Overview, Databases On WWW, Multimedia databases - difference with conventional DBMS, Issues, Similarity based Retrieval, Continues Media-Data, Multimedia Data Formats, Video Servers.

**UNIT 5 - Storage Structure & File Organization**: Overview of Physical Storage Media; Magnetic Disk Performance and Optimization; Basic Idea of RAID; File Organization; Organization of Records in Files; Basic Concepts of Indexing, Ordered Indices; Basic Idea of B-Tree & B* Tree Organization.

Network & Hierarchical Models: Basic Idea; Data Structure Diagram; DBTG Model; Implementation; Tree Structure Diagram, Implementation Techniques; Comparison of the Three Models.

**References**:
1. Date, C. J. "An Introduction to Database Systems" Narosa Publishing House, New Delhi
2. Desai B.C. "An Introduction to Database Concepts" Galgotia Publications New Delhi
UNIT 1-Prerequisite: Array; Structure; Pointers; Pointer to Structures; Functions; Parameter Passing; Recursion.Stack & Queue: Contiguous Implementation of Stack; Various Operation on Stack; Various Polish Notations-Prefix, Postfix Infix; Conversion From one to Another- Using Stack; Evaluation of Post & Prefix Expressions. Contiguous Implementation of Queue; Linear Queue, its Drawback; Circular Queue; Various Operation on Queue; Linked Implementation of Stack & Queue- Operations. General List : List & its Contiguous Implementation, its Drawback; Singly Linked List- Operation on it; Doubly Linked List-Operation on it; Circular Linked List; Linked List Using Arrays.

UNIT 2-Trees: Definitions- Height, Depth, Order, Degree, Parent & Children Relationship etc.; Binary Trees- Various Theorem, Complete Binary Tree, Almost Complete Binary Tree, Tree Traversals-Pre, In & Post Order Traversals, Their Recursive And Non Recursive Implementations; Expression Tree-evaluation, Linked representation of Binary Tree- Operations. Threaded Binary Trees, Forest, Conversion of Forest into Tree, Heap-Definition.

UNIT 3-Searching, Hashing & Sorting: Requirement of Search Algorithm; Sequential search, Binary Search, Index Sequential Search, Interpolation Search; Hashing - Basics, Methods, Collisions, Resolution of Collisions, Chaining; Internal Sorting-Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort on linked and Contiguous List, Shell Sort, Heap Sort.

UNIT 4-Graphs: Related Definitions, Graph Representation- Adjacency Matrix, Adjacency List, Adjacency Multi List; Traversal Schemes- Depth First Search, Breadth First Search; Minimum Spanning Tree; Shortest Path Algorithm; Kruskal & Dijkstra Algorithms.

UNIT 6-Miscellaneous Features: Basic Idea of AVL Tree- Definition, Insertion, Deletion Operations; Basic Idea of B Tree- definition, Order, Degree, Insertion & Deletion Operations; B Tree- Definition, Comparison with B Tree, Basic Idea of String Processing.

References :
1. "Data structure and Program Design In C" Robert L. Kruse.
2. "Introduction to Data Structures" J.P. "Trembley & Sorenson"
3. Algorithms + data Structures = Programs" N. Wirth
4. "Fundamentals of Data structures" E. Horwitz & S. Sannich


204MCA: PROBABILITY AND COMBINATORICS


References:


UNIT 2
Software engineering fundamentals: Definition of software engineering, difference with conventional method of software development, phases of software development life cycle, software project teams, software development process models: waterfall, prototype, spiral. Software Requirement Analysis: Role of software requirement specification, Characteristics and components of software requirement specification, Specification languages, structure of SRS.

UNIT 3
Software design & testing: Fundamental of design concept; abstraction, modularity; types of modules. Coupling and cohesion: content, common, control, stamp, data coupling. Cohesion: coincidental, logical, temporal, procedural, communicational, sequential, functional. Design methodology- Object oriented approach, function approach Vs Object oriented approach, Software metrics: size oriented, function oriented, object oriented metrics. Verification & validation: types of testing (black box and white box testing), unit testing, integration testing, system testing, acceptance testing.

UNIT 4
Software estimation and reliability: Issue in software cost estimation, standard component, function point method, COCOMO. Concept of software reliability, software errors, faults. Reliability metrics.

UNIT 5
SCM & Software maintenance: Fundamental of software configuration management & software maintenance, major elements of SCM, types of software maintenance. CASE Tools & Environment: Concept, Scope of CASE, Classification of CASE Tools, categories of CASE environments.

Books:
301MCA : COMPUTER NETWORKS


UNIT 2: Physical Layer: Concept of Data Transmission, Transmission Media, Switching techniques, Wireless Transmission, ISDN and ATM.


Application Layer: Network Security, DNS, SNMP, E-mail, WWW, Network Multimedia Applications.

References:

Data networks, Dimitri Bertsekas & Robert Gallager, PHI.
Data Networks: Concepts, Theory & Practices, Black, PHI.
Computer Networks & Distributed Processing, Martin J., PHI.
302 MCA: OBJECT ORIENTED PROGRAMMING USING C++


UNIT 2- Basic of C++: Variable & Constants; Data Types; Expression & Statements; cin & cout; Qualifier & Maniupulators; Operators- their priority & associativity; Type Conversion; Casting; Loops & Decisions; Structures: Functions-Inline Functions, Parameter Passing.

UNIT 3- OO Programming in C++: Details of-Objects and Classes: Constructor, Destructor, Function overloading, this pointer, Operator overloading, Inheritance, types of inheritance, Virtual Base Class.

UNIT 4- Miscellaneous Features: Friend Function, Friend Classes, Nested Classes, Static Members. Arrays in C++: arrays as data members, arrays of objects; Dynamic Memory Allocation Operators: new and delete.

UNIT 5- Pointers in C++: pointer to objects, array of pointers to objects, pointers to derived classes, pointers to class members. Virtual Function, Pure Virtual Function, File & Stream Classes, Command Line Arguments; Templates.

Introduction to UML: UML concepts, object-oriented paradigm and visual modeling, UML diagrams, UML specifications, object model, object oriented design, identifying classes and object, object diagrams.

References:

1. "Object Oriented Programming in C++" By Laiore
2. "Programming with C++" By John Hubbard
3. "The C++ Programming Language" By Stroustrup
4. "C++ Inside Outside" By Becker
5. "UML & C++ a practical guide to Object Oriented Development 2 ed, Pearson."
6. Hans Erik Eriksson UML 2 toolkit Wiley
303 MCA E1: UNIX & Shell Scripting

UNIT 1: Overview UNIX & LINUX

Structure of UNIX, evolution of UNIX, Kernel and shell, features of UNIX, UNIX: Installation and booting.

UNIT 2: File System

Unix file system, types of Unix files, Login Directory, Inode-User Identification, file system hierarchy, working directories & parameters, pwd. Basic command for file manipulation like ls, cat, cp, rm, mv, ln, touch, od, mkdir, rmdir, file access permission, types of permissions, determining & changing permission, chown, chmod, chgrp, newgroup, changing your password: passwd.

UNIT 3: Advanced features

Multi user communication & Scheduling: who, write, msg, wall, mail, at, lp, lpstat, pr, news, m0td. Multiple commands on command line, redirecting: standard output to a file, standard input from a file and both, pipelines, and filter: head, tail, paste, sort, uniq, grep, egrep, fgrep, awk, nl. The Process: running a process in the background, process status, terminating a process, delay process. General purpose utilities: more, file, wc, od, cal, banner, cmp, tty, sty, date, etc. System Calls for the System/File Related system calls, process related system call, Mounting and Unmounting File System, Link, Ulink.

UNIT 4: Introduction To Shell Script:

Unix editors: vi, ex, Bourne Shell, C Shell, advance features of shell. Shell variable – system shell variables, local & global variables. Shell meta characters and environment, if and case statements, for, while and until loops. Shell Programming.

UNIT 5: Introduction to Linux: History and features of Linux, Linux structure, Various flavors of Linux, installing Linux.

System Administration: Understanding System Administration, startup & shutting down, Managing user accounts, backing up data, system security.

References:

1. UNIX System -- Rebecca Thomas (McGraw-Hill)
2. Advanced UNIX – Stephen Prata (BPB Publication)
3. UNIX System – Sumitabha Das
4. Operating System by PHI– Milan koewick
303 MCA E2: ERP AND BPR ALLIED CONCEPTS

UNIT 1 - Introduction to ERP: Evolution of ERP, Growth of ERP Market, advantages of ERP, ERP & Related technologies: BPR, MIS, DSS, EIS, Data Warehousing & Data Mining, OLAP, Supply Chain Management.


UNIT 3 - Production & Materials Management Information System: Materials Requirement Planning (MRP), Manufacturing Resource Planning (MRP-II), Bill of Materials (BOM), JIT & Kanban, CAD/CAM, Product Data Management, Make-to-Order (MTO), Make-to-Stock (MTS), Assemble-to-Order (ATO), Engineer-to-Order (ETO), Configure-to-Order (CTO). Accounting & Finance: Accounting & finance activities: creating financial statements, Operational Decision Making Problem, Credit Management, Product Profitability Analysis, ERP & Inventory Cost Accounting Activity, Activity-based costing & ERP.

UNIT 4 - ERP implementation Life Cycle: Pre-evaluation screening, Package evaluation, Project Planning phase, Gap Analysis, Reengineering, Configuration, Implementation team training, Testing, Going live, End user training, Post-implementation, Role of vendors & consultants.

UNIT 5 - Business Process Reengineering (BPR) & its Implementation: BPR, five step methodology to implement BPR, Development process vision & determining process objectives, defining the processes to be reengineered, understanding & measuring the existing processes, identifying the IT levels, designing the prototype & implementing it.

BOOKS:
2. Business Process Reengineering: Jayaraman Natarajan & Rangramanujan
3. ERP Concepts & Practice V.K Garg & Venkitakrishan.
4. Enterprise Resource Planning: Alexis Leon
304MCA: COMPUTER BASED NUMERICAL AND STATISTICAL TECHNIQUES

UNIT 1 - Errors in numerical approximation: Sources of errors, machine error, Relative error, Percentage error, round off in different number system, Interpolation: Gauss Backward, Gauss Forward, Lagranges interpolation, Newton divided Difference, Inverse interpolation.

UNIT 2 - Iterative methods: Zeros of a single transcendental equation and zeros of polynomial using bisections, false position Newton-Raphson etc. Convergence of solutions.

UNIT 3 - Simultaneous linear equations: Solutions of simultaneous linear equations, Gauss elimination method and Gauss-Jordan method, equations and refinement of solutions, Gauss-Seidel iterative methods.


STATISTICAL ANALYSIS:

UNIT 4 - Regression Analysis: Least Square fitting, Polynomial and curve fitting, Linear and nonlinear regression, Correlation, Pearson's coefficient of correlation.

UNIT 5 - Probability Theory: Sample Space events, sampling theory, conditional probability, Bayes formulas, Addition law of probability, Compound events, Use of Binomial Theorem.

REFERENCES:

1. "Basic Statistical Computing" by D. Cook A. H. Lee & T. S. Lee
2. "Statistical Computer Methods Basic" by J. D. Lee & T. D. Lee
3. "Statistical Analysis a Computer Oriented Approach" by A. Affi
5. "System Simulation" by Geoffrey Gordon
6. "Computer Based Numerical Algorithms" by E. V. Krishnamurthy & S. K. Sen
7. "Computer Oriented Numerical Methods" by V. Rajaraman
8. "Linear Algebra" by G. Hadley.
305 MCA: ORGANIZATIONAL BEHAVIOUR

UNIT 1 - Introduction to Organizations and Individuals. What is an organization. Components of organization, nature and variety of organizations (in terms of objectives. Structure etc.) models of analyzing organizational phenomena.

UNIT 2 - Organizational and business variables. Organizations in the Indian context. Institutions and structures. Basic roles in an organization, etc. perception attitudes. Motives (achievement, poser and affiliation).

UNIT 3 - Commitment: Value creativity and other personality factors. Profile of a manager and an entrepreneur.

Interpersonal and Group Processes: Interpersonal trust, understanding the other person from his/her point of view. Interpersonal communication. Listerang, feedback, counseling. Transactional analysis. Self-functioning. Team decision-making team conflict resolution. Team problem solving.


UNIT 5 - Principles Underlying design of organization, organizational change. Integrating cases (s).

Case method and lectures should be supplemented with a variety of other methodologies such as feedback on questionnaires and tests, role plays and behaviour simulation exercise.

References:
401MCA : ANALYSIS AND DESIGN OF ALGORITHMS

UNIT 1- Basic of Algorithm Analysis: Analyzing algorithms, Worst-case and average case analysis, asymptotic notations (Omega, Theta, Big "oh", Little "oh", Little Omega) recurrences: substitution method, master method.

UNIT 2- Advanced Data Structures: Hash tables, Binary trees, Binary Search trees, Binary search, Binary heaps, Heap sort and B-trees.

UNIT 3- Basic Design & Analysis Techniques: Graph algorithms like Depth First Search, Breadth First Search, and Sorting: radix sort, Quicksort, Merge sort, Finding maximum and minimum.

Advanced Design & Analysis Techniques:

UNIT 4- Greedy method: Knapsack Problem, Job Sequencing with Deadline, Single Source Shortest Path, Minimum Cost Spanning Tree algorithms, Dynamic programming: 0/1 Knapsack, Multistage Graphs, Optimal Binary Search Tree.

UNIT 5- Backtracking: 8 Queens Problem, Graph Coloring, Branch and bound: 4-Queens Problem, Travelling Salesperson. NP - Completeness: NP-completeness and NP complete problems.

References:

1. "Fundamentals of Computer Algorithms" by Horowitz & Sahni
2. "Introduction to Algorithms" by Cormen, Leiserson & Rivest
402MCA E3 : Theory Of Computation


UNIT 3-context free grammar and PDA: properties unrestricted grammar & their equivalence, derivation tree simplifying CFG, unambiguity CFG, normal form for CFG, push down automata, 2 way PDA, relation of PDA with CFG. Determinism and non determinism in PDA, and related theorems, parsing & pushdown Automata.

UNIT 4-Turning Machine: model, design, representation of TM, language accepted by TM, universal TM, deterministic and non-deterministic, TM as acceptor/ generator, algorithms, multidimensional, multitracks, multitape, half problems in TM.


References:
1) Marvin L. Minsky “Computation: Finite and Infinite machine”, PHI.
2) Hopcroft and Ullman “Introduction to automata theory, languages & computation”, Narasha PH
3) Lewish “Theory of computation”, PHI
4) Mishra and Chander shekhar “Theory of computer science”(A L &C), PHI
402-MCA E4: Distributed System

UNIT 1-Introduction to Distributed Systems: Goals of Distributed Systems, Hardware and Software concepts, the client server model, Remote procedure call, remote object invocation, message and stream oriented communications.

UNIT 2-Process and synchronization in Distributed Systems: Threads, clients, servers, code migration, clock synchronization, mutual exclusion, Bully and Ring Algorithm, Distributed transactions.

UNIT 3-Consistency, Replication, fault tolerance and security: Object replication, Data centric consistency model, client-centric consistency models, Introduction to fault tolerance, process resilience, recovery, distributed security architecture, security management, KERBEROS, secure socket layer, cryptography.

UNIT 4-Distributed Object Based and File Systems: CORBA, Distributed COM, Goals and Design Issues of Distributed file system, types of distributed file system, Sun network file system.

UNIT 5-Distributed shared memory, DSM servers, shared memory consistency model, distributed document based systems: the world wide web, distributed co-ordination based systems: JINI.

References:

1. Andrew S. Tanenbaum, Maarten Van Steen "Distributed Systems Principles and Paradigms" Pearson Education Inc. 2002
2. Lil "Distributed Computing Principles and Applications".
3. Harry Singh "Progressing to Distributed Multiprocessing" Prentice-Hall Inc.
5. Pinker Y. Varjaa J. P. "Distributed computing Systems, Synchronization, control & Communications" PHI.
403MCA JAVA PROGRAMMING

UNIT 1-Overview of JAVA Programming:
History of JAVA, features of java, how it is differ from C & C++, java program structure, java Statements, JVM, command line arguments
Expression & Operator:
Data types, literals, variables, declaring a variable, dynamic initialization, Arrays, Operators - relational, Arithmetic, logical, assignment, increment & decrement, conditional operator, Bitwise operator, special operator, arithmetic expression, evaluation of expression.
Decision making & Branching:
Control Statements--IF, Switch, Loops, Break, Continue, Return.
UNIT 2-Basic concept of OOPS:
Classes, methods, creating instance & class variable, accessing class member, Constructor, Methods overloading, Method overriding, Static member, final classes, finalizer method, Abstract method & classes, visibility control, Interfaces:Defining interfaces, extending interfaces, implementing interfaces, accessing interfaces, Variables, Package - system package, using system package, creating package, accessing a package, adding a class to a package, Hiding classes.
UNIT 3-Exception Handling & Multithreaded Programming:
Exception Handling: Fundamental, types, uncaught exception, using try and catch, multiple catch, nested try, throw, throws, finally, Java thread model, creating threads, extending thread class, stopping & blocking a thread, Life cycle of thread, thread exception, thread priority, synchronization-implementing and runnable interface, inter thread communication, multithreading.
UNIT 4-Developing web-based program:
What is an applet, applet architecture, applet life cycle, a simple applet program, AWT-Working with Graphics; line, rectangles, ellipses, circles, arcs, polygons Working with colors; Working with fonts. Streams and Files.
UNIT 5-Advance Java
JDBC, JDBC architecture, JDBC Basics, establishing a connection, JDBC Statements. Designing a User Interface with swing - Badals C swing, application framework, adding components to a swing, frame working with swing.
Reference:
1. Programming with java, A primer by “E. Balaguruswamy”.
2. Advance programming in Java by V.K.Jain & Hemiata
3. JAVA 2 platform in 21 DAYS by “Lemay and Cadenhead” by Techmedia pub.
4. The complete reference JAVA 2 by "Patrick Naughton & Harriet Schieltz"
404MCA: Optimization Techniques

UNIT 1-Overview of Operation Research: Problem formulation; Model Construction; O.R. Techniques; Introduction to Linear Programming; Construction of the L.P. Model; graphical L.P. solution, simplex method, Big M method; Primal and Dual Problems.

UNIT 2-Replacement Problems: Capital equipment; Discounted Cost; replacement in anticipation of failure; Age replacement. Transportation and Assignment Problems.

UNIT 3-Queuing Models; Description of Queues; Arrival and Service Times; Birth & Death queuing system; M/M/1 model.

UNIT 4-Game Theory: Pure and Mixed strategy; two person zero sum game; game with and without saddle points; rule of dominance. Project Management Techniques; Network representation; CPM and PERT; optimization of project time and cost; crash cost and crash time.


REFERENCES:
1. "Introduction to Operation Research" by F. S Hite & Liberman
2. "Operation Research" by H. A. Tara
3. "Operation Research" by S.D. Sharma
405 MCA: ACCOUNTING AND MANAGEMENT CONTROL

UNIT 1- Meaning & Objects of Accounting Concepts & Conventions, Accounting Equation, Rules Of Journalizing, Cash Book, Ledger Posting, Preparation Of Trial Balance
UNIT 2- Trading And P/L Account, Balance Sheet With Adjustments Relating to Closing Stock, Outstanding Expenses, Prepaid Expenses, Accrued Income, Depreciation, Bad Debt, Provision For Bad Debt, Provision for Discount on Debtors & Creditors, Provision for Tax
UNIT 3- Inventory Pricing, FIFO & LIFO Methods, Simple Problem of Fund Flow Statements, Cost-Volume Profit Analysis
UNIT 4- Standard Costing, Computation of Material & Labor Variances, Budgetary Control, Preparation of Cash Budget & Flexible Budget
UNIT 5- Management Control & its Characteristics, Goals and its Strategies, Structure and control, Responsibility Centres & Control Centres; Concept of Responsibility Centres, Revenue Center, Profit Center and Investment Center, Transfer Pricing & Responsibility Reporting.

References:

**501MCA : Artificial Intelligence & Expert Systems**

**UNIT 1 - An Overview of AI:** Definitions, Foundations of AI: Philosophy, Mathematics, Psychology, Computer Engineering, linguistics, History of AI, Applications of AI.

**UNIT 2 - AI Production Systems, Search and Control Strategies:**

**UNIT 3 - Knowledge Representations:**
First order predicate calculus, Clause form representation of WFFs, resolution principle & unification, inference mechanism, semantic networks, frame systems and value inheritance, scripts, conceptual dependency.

**UNIT 4 - Natural Language Processing:**
Overview of linguistics, grammars and languages, Parsing techniques: Chart Parsers, transition nets, augmented transition nets, YASP Parser.

**UNIT 5 - Expert systems:**
Introduction and applications of expert systems, Rule-based System Architecture, Non-production system architecture, Expert system shells, dealing with uncertainty: Bayesian reasoning and fuzzy reasoning. Introduction to Some of the AI Techniques like neural networks, genetic algorithms, machine learning, pattern recognition, Robotics etc.

**Books:**

1. Introduction to AI and Expert Systems: D.W. Patterson PHI.
502MCA : Computer Graphics & Multimedia

UNIT 1- Introduction: Computer graphics, definition, classification & applications, development of hardware & Software for computer graphics, Refresh Cathode ray tubes, Random and raster scan devices, DVST, plasma panel display, LED and LCD monitors, laser devices, printers, plotters, display processors, raster and random scan system.

Output primitives: DDA along with, Bresenhan’s line drawing algorithm, antialiasing, circle generation: Midpoint algorithms, ellipse, other curves, character generation, area filling scan line algorithm, boundary fill flood fill algorithm, attributes of output primitives, line attributes, area fill attributes, character attributes.

UNIT 2- Two-dimensional Transformations and Clipping: Translation, scaling, rotation, reflection, shear, matrix representation and homogeneous coordinates, composite transformation commands. Viewing coordinates, window, view port, window to view transformation, line clipping Cohan Sutherland algorithm, polygon clipping, Sutherland-Hodgeman algorithm.

UNIT 3- Three-dimensional Concepts: Three-dimensional viewing, three-dimensional object presentation: polygons, curved line & surfaces quadrature (sphere, ellipsoid), surfaces, design of curves & surfaces, beziers methods, Bezier methods, three-dimensional transformation: Translation, scaling, composite transformation, rotation, about arbitrary axis, projection: parallel, perspective.

UNIT 4- Visible surface detection: Classification of visible-surface detection algorithms, back face detection, depth buffer methods, A-buffer method, scan line method, depth sorting method. Illumination and shading: Light sources, diffuse reflection, specular reflection, reflected light, texture, shadows, light intensity intensity levels. Surface shading, constant intensity, gouraud shading, phong shading.


Books:

503MCA SIMULATION AND MODELLING

UNIT 1- Definition of simulation: Type of simulation (continuous & discrete), Definition of models, Types of models, Comparing model data with real system data. Why to use simulation? Simulation is used for solving real life problem.

UNIT 2- Limitation of simulation technique, Phases of simulation model, Data generation, Book keeping, Events Type simulation (numerical problems), Generation of random numbers, Monte Carlo simulation (Numerical problem).

UNIT 3- Continuous system simulation: Continuous system models, Differential equation, Hybrid computer, continuous system simulation languages (CSSLS), simulation of an autopilot, real time simulation.

Probability concept in simulations: numerical evaluation of continuous probability Function, continuous uniformly distributed random numbers, non uniform continuous distributed random numbers, the Rejection method, discrete simulation language, simulation of telephone system.

UNIT 4- Simulation: Application to Inventory Control, Queuing problem, Capital budgeting, Financial Planning, Advantages and disadvantages of simulation, scope of simulation techniques.

UNIT 5- Introduction to SIMSCRIPT: SIMSCRIPT programs, SIMSCRIPT system concept, organization of SIMSCRIPT programs, Names and labels, SIMSCRIPT statement, defining the telephone system model, referencing variables, the MAIN routine, the Arrival events, the Timing routine, the closing event, Disconnect event.

References:
1. System Simulation, G. Gordon, PHI
2. Introduction to simulation, T. A. Page, Mcgraw Hill
4. Operation research by Kripl and Gupta
5. Operation research by B.D. Sharma, Kaclar Nath publications.
504 MCA - Data warehousing and data mining

UNIT 1: Introduction to Data Mining: Data Mining, features, business context, technical context, approaches to data mining. Types of Data Mining: Direct & Undirected, Virtuous Cycle.


UNIT 3: Introduction to Datawarehouse: Data warehousing concepts, Goals & objectives, Issues involved in Data Warehousing. The three C's of Data Warehousing: Commitment, Completeness & Connectivity, OLAP, Types of Data Warehouses.

Contracting a Data Warehouse System:

UNIT 4: Stages of the Project: Planning stage: Justifying the data warehouse, obtaining user buy-in, overcoming resistance to the Data Warehouse. Developing a project plan: Data Warehouse Design approaches. Architectural stage: Process architecture, Introduction, Load manager, Query manager, Detailed Information, Summary Information, Metadata, Data Marting.

UNIT 5: Testing the Data Warehouse: Introduction, developing the test plan, testing backup recovery, testing the operational environment, testing the database, testing the application, Logistics of the test, Security, Requirements, performance, Impact of security, security impact on design.

References:
1. "Data Warehousing" by Arvind Sinha.
2. "Data Warehouse in the Real World" by Sam Athally & Dennis Murray.
505 MCA-E5 : Cloud Computing

Unit 1: Historical development, Vision of Cloud Computing, Characteristics of cloud computing as per NIST, Cloud computing reference model, Cloud computing environments, Cloud services requirements, Cloud and dynamic infrastructure, Cloud Adoption and rudiments. Overview of cloud applications: ECG Analysis in the cloud, Protein structure prediction, Gene Expression Data Analysis, Satellite Image Processing, CRM and ERP, Social networking.


Unit 3: Cloud Management & Virtualization Technology: Resiliency, Provisioning, Asset management, Concepts of Map reduce, Cloud Governance, High Availability and Disaster Recovery. Virtualization: Fundamental concepts of compute, storage, networking, desktop and application virtualization, Virtualization benefits, server virtualization, Block and file level storage virtualization, Hypervisor management software, infrastructure Requirements, Virtual LAN (VLAN) and Virtual SAN (VSAN) and their benefits.


Unit 5: Market Based Management of Clouds, Federated Clouds/Inter Cloud: Characterization & Definition, Cloud Federation Stack, Third Party Cloud Services, Case study: Google App Engine, Microsoft Azure, Hadoop, Amazon, Aneka.

References:
1. Buyya, Selvi, Mastering Cloud Computing, TMH Pub
2. Umer Saurabh, Cloud Computing, Wiley Pub
5. Gosney, Cloud Computing, Wiley Pub
505 MCA-E6 .Net Technology

Unit 1 Introduction to .NET Technology, Introduction to VB.NET, Software development and Visual Basic .NET, Visual Basic .NET and .NET frame.


Unit 3 Classes and Objects: Types, Structure and Enumeration, Classes, Interfaces, Exception handling and Classes, Collections, Arrays and other Data Structure.

Unit 4 Advanced design concepts, Patterns, Roles and Relationships, Advanced Interface Patterns: Adapters and Delegates and Events Data Processing and I/O.

Unit 5 Writing Software with Visual Basic .NET, Interfacing with the End User, Introduction to ASP.NET and C#.NET and their features.

References:
4. Alex Homer, Dave Sussman "Professional ASP.NET 1.1" Wiley Dreamtech
5. Bill Evjen Bill Evjen "Professional VB.NET 2003" Wiley Dreamtech